

# Sigma Xi Today

A NEWSLETTER OF SIGMA XI, THE SCIENTIFIC RESEARCH HONOR SOCIETY

## Sigma Xi Reflects on the Past and Plans Ahead

Sigma Xi has released two key documents for the Society: the *Fiscal Year 2019 Annual Report* and the *2020–2025 Strategic Plan*.

The annual report shares stories and data that demonstrate how Sigma Xi is fulfilling its mission to build a strong research community, ensure integrity in science and engineering, and help the public understand the processes and results of research.

For example, last year 560 members volunteered to serve as chapter leaders to achieve Sigma Xi's mission on a local level; 50,000 people came together for research-related chapter events; 3,200 accomplished scientists and engineers were inducted as new members; 600 STEM students received direct support through competitions and grants; and 99,500 readers connected with the Society through *American Scientist*.

The strategic plan is a new course for the future that focuses Sigma Xi's resources and efforts on four main priorities: 1) to advance science, technology, engineering, and math education, 2) to promote scientific leadership and influence, 3) to cultivate a diverse, robust, and inclusive community, and 4) to demonstrate administrative excellence and fiscal responsiveness.

The Society's leadership is calling on members to help carry out this important work. Please visit <https://www.sigmaxi.org> to learn how to get involved in your local Sigma Xi chapter, a program, or a committee. Both documents are posted in full on the website under the About section.

Sigma Xi Today is managed by Heather Thorstensen and designed by Dena Verdesca.

## From the President

### Keeping the Public Trust

In the modern world, we are barraged with a wide range of opinions on scientific issues that include the causes of climate change, healthy food choices, and the value of different medicines, including vaccinations. This diversity of opinions, many that question the validity of compelling data, parallels the growth in accessibility of information through social and news media outlets. Separating fact from fiction has also become increasingly difficult for the general population.

On the positive side, public confidence in the scientific community has increased in recent years. As reported recently by the Pew Research Center, 35 percent of Americans say they have a great deal of confidence in scientists. This is up 14 percentage points from 2016, and this data is backed by a number of credible studies.

As scientists and engineers, we should all be proud of this positive perception of our efforts. But this is not the time to rest on our laurels. As with many things in our world today, this credibility can easily erode.

We all have a role to play in building and maintaining public confidence in the scientific enterprise. One does not have to look far to find recent reports of scientists and engineers accused of inappropriate professional behavior, many highly respected in their fields. Whether the charges or accusations will be validated is, of course, up to the legal process and the institutions involved. Although these cases are worrisome, they also provide an excellent opportunity for *all* of us to examine what constitutes appropriate professional behavior in our laboratories, our meetings, and our communities.

Many professional societies, including Sigma Xi, are taking these issues more seriously than ever in their development of codes of conduct and guidelines for dismissal of members or fellows. Discussions of the implementation of these guidelines may make some uncomfortable. But such discomfort is important as we seek the best solutions to ensuring confidence in the scientific enterprise. We look forward to your input as Sigma Xi works over the next year to further clarify the expectations and definitions of exemplary behavior of our members in our pursuit of research excellence, discovery, and innovation.

I am proud to be president of an organization that has a 134-year history of electing and honoring members who embody the core values of the Society: excellence, integrity, diversity, scholarship, leadership, and cooperation. Sigma Xi's distinguished history of service to science and society continues today through our chapters, events, and activities.

As Sigma Xi members, we must never forget the important roles we play as mentors, leaders, and ambassadors for science.



Geraldine Richmond

Geraldine Richmond



## Sigma Xi Will Showcase Art and Science Collaborations at Its Annual Meeting

Sigma Xi will highlight interdisciplinary collaborations, particularly those that connect art and science, in preparation for its Annual Meeting and Student Research Conference in November, where the theme will be *Hacking the Brain: The Intersection of Art and Neuroscience*.

From October to December 2019, Sigma Xi was part of *As Above As Below*, a collection of six multimedia and interactive exhibits in San Francisco created by teams of artists, astrophysicists, and neuroscientists. Each exhibit explored the parallels between galactic and neuronal networks. The collection was curated and produced by Esther Mallouh of Keen on Art.

Some of the collaborators sat on a panel discussion, moderated by Sigma Xi Executive Director and CEO

Jamie Vernon, for the exhibit opening to discuss their projects and what it was like to work together.

"I think the bottom line of this is that artists and scientists are looking for creative solutions to innovate," said Forest Stearns, the creative innovation consultant and artist in residence founder at Google AI Quantum.

Joel Primack, Sigma Xi immediate past president and a distinguished professor of physics emeritus at the University of California, Santa Cruz, said he came away with a new perspective about his own research.

"In working with Olaf Sporns [of Indiana University Bloomington], who is one of the great experts in how the nervous system is connected, especially the brain, I learned a lot about how to analyze networks, and I hadn't actually gone in that di-

rection before in my own research," Primack said.

While some artists pitched concept ideas to their scientists, artist Anastasia Victor, who designs 3D interfaces and interaction for extended reality, said her team worked together from start to finish.

"It was both a really amazing process and also incredibly challenging, I think for all of us, (a) to determine a shared language, and (b) because we have a certain degree of domain expertise," Victor said. "Being accustomed to having a really comprehensive understanding of a space and then coming into having to negotiate that with other people was a really remarkable part of this process."

Sigma Xi is working with Mallouh to feature some of the artistic collaborations at its meeting in Alexandria.

Wendy Leyden

## Sigma Xi Annual Meeting and Student Research Conference

November 5–8, 2020 • Alexandria, Virginia

### Conference Tracks

**See:** Neural and computational mechanisms of vision and their relation to visual arts, data visualization, computer-based vision, and robotic vision

**Hear:** Computational and experimental methodologies that investigate the brain's response to performing, composing, or listening to music, and the use of sounds in art and communication

**Move:** How neuroscience and cognitive science inform artificial intelligence and robotics design, and the application of movements such as dance as a therapeutic tool for neurological disorders

**Science Communication, Education, and Public Engagement:** Communicating science through art; integrating arts and humanities in STEM education, evaluation strategies, and best practices

**Research Enterprise and Professional Development:** The integration of arts in basic and translational research, cultivating effective interdisciplinary collaborations, leadership training, science policy, publishing, mentorship, and diversity

**Research Ethics:** Ethical challenges facing the research community, ethics of artificial intelligence and machine learning applications, how neurotechnology may be used to affect human behavior



## Grants in Aid of Research Recipient Profile: Ciara Crochet

**Grant:** \$1,000 in Spring 2018

**Education level at the time of the grant:** Undergraduate student

**Project:** My experiment involved investigating hormonal predictors of aggression and dominance in coercive, live-bearing fish. Dominance hierarchies ensue in many social organisms as a primary means of reducing prolonged aggression. Social dominance is usually established from aggressive behaviors, or dominant males blocking mating attempts from other, lower-ranking males. In addition to aggressive and mating behaviors, androgen hormones may play important roles in mediating dominance behaviors in many vertebrate species. 11-ketotestosterone (11-KT) and cortisol influence social dominance in many fishes; for example, 11-KT has been found to mediate aggressive behavior as well as male competition, and cortisol has been found to fluctuate during the establishment of dominance hierarchies. Few studies have focused on dominance in animals with dynamic social systems, such as shoaling fishes, where males interact in larger groups for shorter periods of time.

My research provides a potential mechanism to explain the formation of male dominance hierarchies through assessing the potential effects of 11-KT and cortisol on social dominance in competing, coercive males. The results contribute to the field of behavioral endocrinology by providing new information on the role hormones play in aggression and social dominance in vertebrates.

The funds provided multiple enzyme-linked immunosorbent assay (ELISA) kits to detect and quantify the androgen hormone 11-KT, dedicated glassware to avoid contamination, and syringes for both collecting and processing blood.

**How the project influenced you as a scientist:** This project greatly encouraged me to pursue my passion for research, and it gave me the opportunity to work with other labs. The experience, the opportunity, and the doors the project has opened for me have been invaluable.

**Where are you now?** I was inducted into Sigma Xi in 2018, and I have completed my bachelor's degree in behavioral neuroscience. I am pursuing a master's degree in data analytics and completing other research projects on humans and fish. I plan to pursue a PhD in behavioral endocrinology and look forward to continuing to contribute to scientific research.

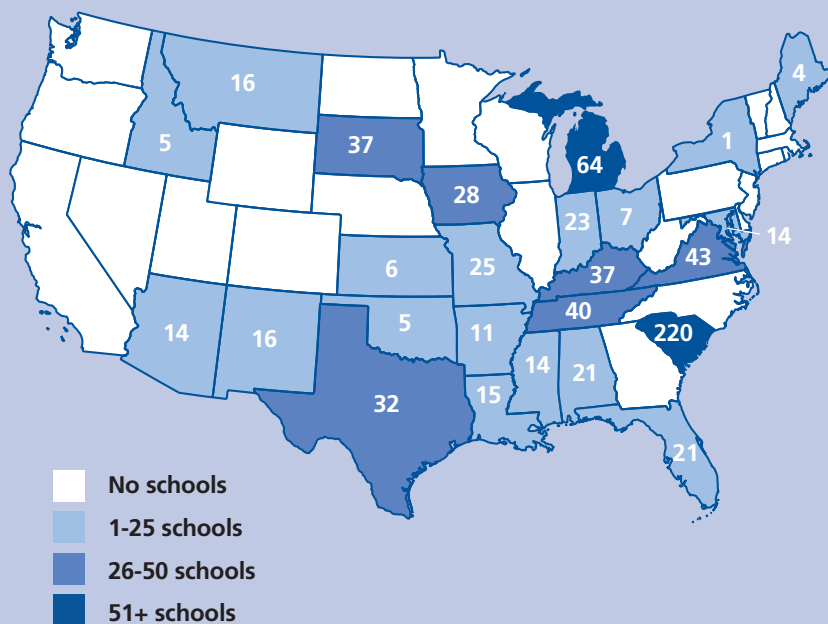


Ciara Crochet received a grant as an undergraduate student.

### Sending *American Scientist* to High Schools

Sigma Xi members and supporters raised \$15,864 on Giving Tuesday to send *American Scientist* to 719 high schools throughout 2020. Schools were eligible if they are in one of 25 states where laws or proposals threaten the integrity of science education. The schools were identified through public nominations. Thank you!

#### Number of High Schools Receiving *American Scientist* by State





### Marta Diez-Valcarce

*Postdoctoral fellow at the Rollins School of Public Health of Emory University*

Personal relationships have been the most helpful resources to my career. Network, meet people, reach out to people you admire. Most of the time people are happy to talk to other scientists who are genuinely interested in what they do. Tell them what you would like to do, what you know, and what you don't know but you would like to learn. Listen to their advice. Magic happens when you listen.



Koji Furukawa

### Danielle Wood

*Director of the Space Enabled Research Group at the Massachusetts Institute of Technology*

When I was an undergraduate student, working in university research laboratories or government internships—such as NASA's internship program—gave me valuable experience. I participated in professional organizations as a volunteer, specifically the International Astronautical Federation and the American Institute for Aeronautics and Astronautics. I earned fellowships from NASA, the National Defense Science and Engineering Graduate Fellowship, and the National Science Foundation's Graduate Research Fellowship Program as a graduate student to support my education.

## Resources That Helped Women in STEM

*Sigma Xi asked female members about the resources that have been most helpful to their careers as women in science, technology, engineering, and math (STEM).*



### Ella A. Kasanga

*PhD candidate at the University of North Texas Health Science Center*

Seeking advice from mentors is one resource that has been invaluable. My mentors haven't only been senior colleagues but also peers who have provided perspectives that I wouldn't obtain otherwise.

Attending conferences like the Sigma Xi Annual Meeting and Student Research Conference and the Society for Neuroscience (SfN) Annual Meeting has proven very useful. The opportunity to interact with other researchers, exchange ideas, and form collaborations is a gift that shouldn't be looked down upon, especially in the era where collaborative science is gaining popularity. At the SfN meeting, a special luncheon is organized for female scientists, creating a unique avenue to interact with both seasoned scientists and peers. This is an effective way of establishing one's professional support system, which is very important in every field.

I have found the SfN Neuronline platform very useful for finding scientific research, training, and professional development resources, such as virtual conferences.

As a young woman who is gradually building her career in STEM, the experience can be quite overwhelming; however, I strongly believe that with the right resources and support system, a successful STEM career is definitely within reach.



### Kelly K. Falkner

*Director of the National Science Foundation's Office of Polar Programs*

Curiosity and resilience come to mind as qualities that helped me the most to remain motivated and overcome innumerable obstacles to advance my career. I recommend that those who wish to pursue a career in STEM consciously cultivate curiosity for the fun and insights it generates. Surround yourself with people in schools, training programs, societies, and other groups who pursue what makes them wonder, and learn from them. Deliberately exercise curiosity so you don't lose that "muscle" we are all born with.

You are going to need to draw on resilience; while it seems that all human beings long to belong, there will be times when you will feel like you don't. If you feel the confidence slipping, pull out your resume and read it! Let your accomplishments speak to you. If you managed to get this far, you have what it takes to forge on.

Make it a point to pursue activities that fortify your resilience. For me, that included taking regular breaks from STEM matters. The most important resources? Colleagues, friends, and family who can help navigate the challenges as they inevitably emerge. Music, art, athletics, social gatherings, teaching others, volunteering—whatever it takes to keep your perspective healthy and balanced.